Volunteer Lake Assessment Program Individual Lake Reports

MOUNTAIN LAKE, UPPER, HAVERHILL, NH

MORPHOMETRIC DATA

Watershed Area (Ac.):	2,155	**Max. Depth (m):**	5.5	**Flushing Rate (yr^{-1}):**	17.1
Surface Area (Ac.):	30	**Mean Depth (m):**	2.5	**P Retention Coef:**	
Shore Length (m):		**Volume (m^3):**	232,500	**Elevation (ft):**	776

TROPHIC CLASSIFICATION

Year	Trophic class
1984	MESOTROPHIC
2006	EUTROPHIC

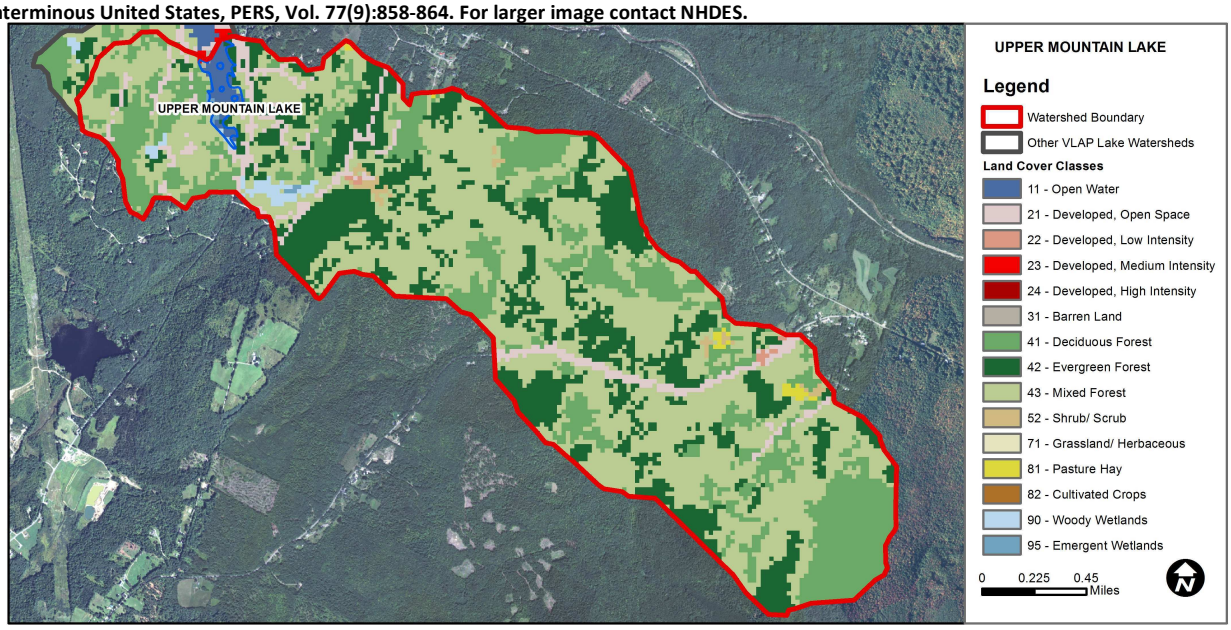
KNOWN EXOTIC SPECIES

The Waterbody Report Card tables are generated from the DRAFT 2014 305(b) report on the status of N.H. waters, and are based on data collected from 2004-2013. Detailed waterbody assessment and report card information can be found at www.des.nh.gov/organizations/divisions/water/wmb/swqa/index.htm

Designated Use	Parameter	Category	Comments
Aquatic Life	Phosphorus (Total)	Cautionary	The calculated median is fewer than 5 samples but > indicator and the chlorophyll a indicator is okay. More data needed.
	pH	Slightly Bad	>10% of samples exceed criteria by a small margin (minimum of 2 exceedances).
	Oxygen, Dissolved	Encouraging	There are < 10 samples with 0 exceedances of criteria. More data needed.
	Dissolved oxygen satura	Slightly Bad	There are >10% of samples (minimum of 2), exceeding criteria.
	Chlorophyll-a	Good	The calculated median is from 5 or more samples and is < indicator and > 1/2 indicator.
Primary Contact Recreation	Escherichia coli	Very Good	Where there are no geometric means, all bacteria samples are < 75% of the geometric mean. Where there are geometric means all single bacteria samples are < the SSMC and all geometric means are < geometric mean criteria.
	Chlorophyll-a	Good	There are at least 10 samples with one, but < 10% of samples, exceeding indicator.

WATERSHED LAND USE SUMMARY

Fry, J., Xian, G., Jin, S., Dewitz, J., Homer, C., Yang, L., Barnes, C., Herold, N., and Wickham, J., 2011. Completion of the 2006 National Land Cover Database for the Conterminous United States, PERS, Vol. 77(9):858-864. For larger image contact NHDES.



Land Cover Category	% Cover	Land Cover Category	% Cover	Land Cover Category	% Cover
Open Water	1	Barren Land	0.03	Grassland/Herbaceous	0
Developed-Open Space	4.72	Deciduous Forest	21.45	Pasture Hay	0.35
Developed-Low Intensity	0.17	Evergreen Forest	22.87	Cultivated Crops	0
Developed-Medium Intensity	0.02	Mixed Forest	46.8	Woody Wetlands	0.75
Developed-High Intensity	0	Shrub-Scrub	0.56	Emergent Wetlands	0.13

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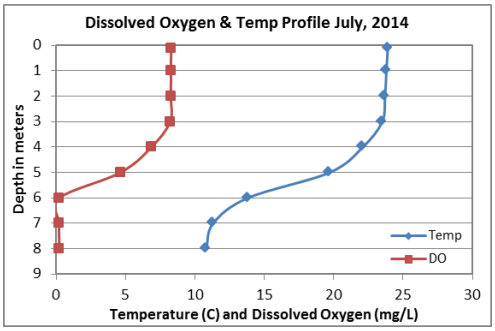
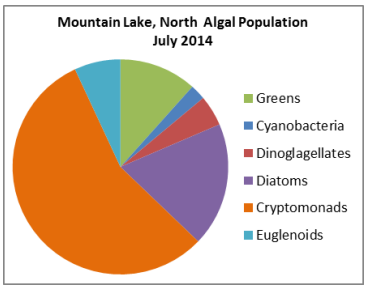
Mountain Lake, North, Haverhill

2014 Data Summary

Observations and Recommendations (*Refer to Table 1 and Historical Deep Spot Data Graphics*)

- **Chlorophyll-a:** Chlorophyll levels were slightly elevated, increased from 2013, and were greater than the state median. Historical trend analysis indicates highly variable chlorophyll levels since monitoring began.
- **Conductivity/Chloride:** Deep spot and Outlet conductivity levels were slightly elevated and greater than the state median. Historical trend analysis indicates relatively stable epilimnetic (upper water layer) conductivity with moderate variability between years.
- **E. coli:** Beach E. coli levels were much less than the state standard of 88 cts/100 mL for public beaches.
- **Total Phosphorus:** Epilimnetic phosphorus levels were low, decreased slightly from 2013, and were much less than the state median. Historical trend analysis indicates highly variable epilimnetic phosphorus levels since monitoring began. Hypolimnetic (lower water layer) phosphorus levels were also low and less than the state median. Outlet phosphorus levels were low.
- **Transparency:** Transparency measured without the viewscope (NVS) was below average and slightly less than the state median. Historical trend analysis indicates significantly decreasing (worsening) transparency since monitoring began. Transparency measured with the viewscope (VS) was much better than that measured without and likely a better representation of actual conditions.
- **Turbidity:** Epilimnetic and Outlet turbidities were slightly elevated likely due to algal growth. Hypolimnetic turbidity improved in 2014, but remained slightly elevated. This was likely due to the accumulation of organic compounds in hypolimnetic waters as the summer progressed and dissolved oxygen levels decreased to less than 1.0 mg/L, as shown in the Dissolved Oxygen and Temperature graphic.
- **pH:** Epilimnetic and Outlet pH were within the desirable range 6.5-8.0 units, however Hypolimnetic pH was slightly less than desirable. Historical trend analysis indicates relatively stable Epilimentic pH with moderate variability between years.
- **Recommended Actions:** Increase monitoring frequency to once per month during the summer to better assess seasonal and historical water quality trends and decrease data variability. Epilimnetic phosphorus and chlorophyll levels have decreased since the spike between 2006 and 2008, however levels remain above average for the lake. The worsening transparency trend is likely due to the above average algal growth. Cyanobacteria, a potentially toxic algae, have become more prevalent in the plankton samples collected in recent years. Cyanobacteria can utilize the nutrient phosphorus for growth, but can also utilize the nutrient Nitrogen. Recommend collecting Nitrogen samples at the deep spot to assess nitrogen availability for algal growth. Keep up the great work!





Station Name	Table 1. 2014 Average Water Quality Data for MOUNTAIN LAKE, NORTH								
	Alk. mg/l	Chlor-a ug/l	Cond. uS/cm	E. Coli #/100ml	Total P ug/l	Trans. m		Turb. ntu	pH
						NVS	VS		
Epilimnion	12.8	6.16	84.9		6	3.05	4.50	1.30	7.11
Hypolimnion			86.4		11			3.74	6.35
Beach				18					
Outlet			84.9		6			1.30	7.12

NH Median Values: Median values for specific parameters generated from historic lake monitoring data.
Alkalinity: 4.9 mg/L
Chlorophyll-a: 4.58 mg/m^3
Conductivity: 40.0 uS/cm
Chloride: 4 mg/L
Total Phosphorus: 12 ug/L
Transparency: 3.2 m
pH: 6.6

NH Water Quality Standards: Numeric criteria for specific parameters. Results exceeding criteria are considered a water quality violation.
Chloride: > 230 mg/L (chronic)
E. coli: > 88 cts/100 mL – public beach
E. coli: > 406 cts/100 mL – surface waters
Turbidity: > 10 NTU above natural level
pH: between 6.5-8.0 (unless naturally occurring)

Historical Water Quality Trend Analysis

Parameter	Trend	Explanation	Parameter	Trend	Explanation
Conductivity	Stable	Trend not significant; data moderately variable.	Chlorophyll-a	Stable	Trend not significant; data highly variable.
pH (epilimnion)	Stable	Trend not significant; data moderately variable.	Transparency	Worsening	Data significantly decreasing.
			Phosphorus (epilimnion)	Stable	Trend not significant; data highly variable.